

REQUIREMENTS FOR
WELDING AND NONDESTRUCTIVE EXAMINATION
FOR NUCLEAR CLASS MC COMPONENTS

NO. 9763-WS-1-NE

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE

SEABROOK STATION

UNITED ENGINEERS & CONSTRUCTORS INC.

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WS-1-NE
REQUIREMENTS FOR
WELDING AND NONDESTRUCTIVE EXAMINATION
FOR
NUCLEAR PRESSURE CLASS MC COMPONENTS

FOR

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
SEABROOK STATION

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WS-1-NE
REQUIREMENTS FOR
WELDING AND NONDESTRUCTIVE EXAMINATION
FOR
NUCLEAR CLASS MC COMPONENTS

1.0 SCOPE

This specification covers requirements for welding and nondestructive examination of nuclear components, including containment vessels, penetration assemblies or appurtenances to be attached to the containment vessel, and connections of piping, pumps & valves performing a containment function, as classified in the ASME Boiler & Pressure Vessel Code, Section III, Div. 1, Subsection NE.

2.0 GENERAL

The equipment specification will reference the applicable code(s) to which the fabrication and testing of the component(s) is to be performed. It will also delineate any deletions of and/or addition to the requirements of this section for the particular component(s) to be fabricated.

2.1 DEFINITIONS

Nuclear components as used in this specification include the containment vessel, and connection of parts or appurtenances such as piping, pumps, valves, penetration assemblies, personnel and equipment hatches to the containment vessel.

Welding definitions used in this document are in accordance with AWS A3.0 and Section IX, Appendix I of the ASME Code.

2.2 SYMBOLS

All component drawings which show fabrication by welding shall indicate the joints, together with the required weld joint geometry, welding procedure number, extent and type of inspection in accordance with AWS Standards A2.0 and A2.2.

2.3 CODES AND STANDARDS

The issue of the documents contained below, and in the equipment specification, in effect on the date of invitation to bid, or purchase order, as applicable when supplying items to this document.

Paragraph Numbers (such as NE-5350) specified herein without a reference are understood to be taken from ASME Code Section III, (Div. 1) Nuclear Power Plant Components.

American Society of Mechanical Engineers (ASME)

Section II, Material Specification Part C - Welding Rods, Electrodes and Filler Metals.

Section III, (Div. 1) (Subsection NE) Nuclear Class MC Components.

Section III, (Div. 1) (Subsection NA) General Requirements.

Section V, Nondestructive Examination.

Section IX, Welding Qualifications.

American Welding Society (AWS)

A2.0, Standard Welding Symbols

A2.2, Nondestructive Testing Symbols

A3.0, Definitions, Welding and Cutting

American Society for Nondestructive Testing (ASNT)

SNT-TC-1A, Recommended Practice for Nondestructive Testing Personnel Qualification and Certification.

American Society for Testing and Materials (ASTM)

ASTM Standards as referenced in the body of this document.

3.0 DETAILED REQUIREMENTS

3.1 WELDING QUALIFICATIONS

3.1.1 Personnel and Procedure

Welding procedure qualifications and welder performance qualifications shall be in accordance with ASME Boiler & Pressure Vessel Code, Section(s) III, (Div. 1) (Subsections NA & NE) and IX, Welding Qualifications, and Addenda.

In addition to the aforementioned code, the requirements specified herein shall also apply. Welding procedure qualification(s) shall require where required by code, weld current, arc voltage, and tolerances on current and voltage, minimum preheat and maximum interpass temperatures, and travel speed, for each electrode type and welding filler material covered by the specific qualifications. Welding procedures shall be qualified at the minimum preheat temperature.

Any essential variables in addition to those presently shown on QW-483 (formerly Q-1) shall be recorded.

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3.1.2

Impact Tests

Where charpy impact tests are required, they shall be performed in accordance with Section III (Div. 1) Subsection NE of the ASME Boiler & Pressure Vessel Code.

3.1.3

Qualification for Welding Stainless Steel

Procedure qualifications for welding of austenitic stainless steel shall include the following requirements:

3.1.3.1

Control of all austenitic welds to minimize fissuring and sensitization for ASME Class MC components shall be accomplished as follows.

3.1.3.2

Welding procedures shall include restrictions governing heat input as controlled by voltage, bead width, electrode size, minimum preheat temperature, maximum interpass temperature (350°F) and travel speed. Bead width shall be a maximum of three(3) times the core diameter for the manual shielded metal arc welding process.

3.1.4

Welding Process Details

- (a) Backing strips or rings shall conform to the requirements of NE-4240. Materials for backing rings, when used shall be compatible with the base metal. Permanent backing rings when permitted by NE-4240, shall be continuous and any splices shall be made by full penetration welds. Spacer pins shall not be incorporated into the welds.

- (b) Consumable inserts shall be of the same nominal composition as the bare filler wire.

3.2

SPECIAL PROCEDURE QUALIFICATIONS

Whenever contractor's fabrication process and/or the referencing specification section requires dissimilar metal welds, dissimilar weld metal overlay, a separate procedure and performance qualification shall be required in accordance with the respective subparagraphs which follow.

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3.2.1

Dissimilar Metal Welds Qualification

For dissimilar metal welds, procedure and performance qualification shall be accomplished by the rules of the ASME Boiler & Pressure Vessel Code(s), Sections III (Div. 1) Subsection NE and Section IX.

3.2.2

Dissimilar Weld Metal Overlay Qualification

Qualifications for dissimilar weld metal overlay shall be in accordance with ASME Sections III (Div. 1) and IX. The following additional requirements shall also apply:

- (a) For the cladding chemical analysis, in no case shall the carbon content of the sample exceed .08% C or shall the contents of Cr and Ni be below 18% and 8% respectively when the base material is carbon steel to stainless steel cladding.
- (b) A 12% maximum iron content shall not be exceeded for Ni-Cr-Fe (F-43) cladding to carbon steel.
- (c) The chemical analysis for the requirements of subparagraphs (b) and (c) shall be obtained from the test assembly overlay using material obtained to a depth from the surface of at least 0.020 in. but not greater than the min. cladding thickness to be qualified by the procedure qualification.

3.3

WELDING PROCESSES

General welding shall be performed by one or more of the following processes with butt welds being of multipass construction using filler metal:

- (a) Manual Shielded Metal-Arc (SMAW)
- (b) Submerged Arc (SAW)
- (c) Gas Tungsten-Arc (GTAW)
- (d) Gas Metal-Arc (GMAW) (not acceptable if utilizing the short circuiting or globular mode of transfer for austenitic stainless steel).
- (e) Other welding processes may be permitted by the Purchaser after demonstration of process suitability. Wash pass welding (remelting of cover pass to smooth weld contour) is not permitted.
- (f) Any process used shall be such that the record required by NE-4320 can be made with the exception of the stud welding processes which shall be restricted to the applications stipulated in NE-4311.1.

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3.4 FILLER METALS

3.4.1 General Requirements

- 3.4.1.1 Filler materials shall be supplied with actual reports of chemical and physical tests for each heat and lot number supplied, except physical tests are not required for consumable inserts and stainless steel filler materials. These tests shall be performed on all filler materials as supplied. When welding with the submerged arc welding process physical and chemical test reports shall be supplied for each heat of filler wire and lot of flux combinations. All chemical analyses shall be performed on an undiluted weld deposit.
- 3.4.1.2 Filler metals and consumable inserts used for austenitic stainless steel welds shall be selected and controlled to produce welds that contain 5 to 20 per cent ferrite or (FN) ferrite number 5 to 23 based upon chemical analysis of weld metal compared to Schaeffler Diagram for stainless steel weld metal, and one of the two following methods:
1. Aminco-Drenner Magne - gage measurement
 2. Severn - gage measurement
- 3.4.1.3 Certificate of Test on filler materials and consumable inserts shall show percentage of ferrite for each heat and lot of material as determined by Schaeffler diagram and Magne-gage or Severn-gage measurement.
- 3.4.1.4 Filler materials shall be in accordance with ASME Boiler & Pressure Vessel Code, Section II Part C and as amended by Section III ASME Boiler & Pressure Vessel Code, (Div. 1) Subsection NE, Para. 2400.
- 3.4.1.5 The electrode and filler metal supplier shall be required by the purchase order to submit to the contractor, certified copies of the results of all tests required by the order, with or before shipment of the material.

3.4.2 Specific Requirements

3.4.2.1 Gas Tungsten Arc Wire

All bare filler metal rods shall be individually flag-tagged with the alloy number.

3.4.2.2 Coated Electrodes

All coated electrodes shall be received in properly identified, hermetically sealed metal containers, and upon opening shall be maintained in heated holding ovens. Dry covered electrodes, low hydrogen type, not previously wetted, shall be used. For P-1

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materials, the electrode manufacturer's recommendations for drying shall be followed. For other electrode classes, removal from holding oven, or if not used within four hours after the container is opened, shall be dried in a vented electric oven maintained at 250°F to 350°F for at least eight(8) hours. The temperature of storage area shall be maintained above 65°F.

3.4.2.3 Consumable Insert Material

All consumable inserts shall be stamped with the alloy number.

3.4.2.4 Nonconsumable Tungsten Electrode

2% EWTh - AWS A5.12 (2% Thoriated Tungsten)

3.4.2.5 Welding, Purging and Shielding Gases

Where inert gas is used, the gas shall be welding grade Argon, (99.95% purity), helium or mixtures thereof.

3.4.3 Filler Metal Handling Requirements

- a) The contractor shall submit a plan to the purchaser, for approval, for the implementation of welding material control which shall cover but not be limited to the provisions listed in Section 3.4 of this document. This plan shall contain a detailed description covering filler metals from its procurement through its final usage.
- b) All filler materials, coated electrodes and consumable inserts shall be properly identified to the point of consumption. At no time shall unidentified material or discarded electrode stubs be used.
- c) Wire or rod shall be controlled by the use of a weld rod requisition form. Filler materials shall be issued to the welder only upon submission to the storeroom of a filler metal requisition form signed by the welding engineer or welding foreman. The requisition form shall specify:
 1. Type of filler material
 2. Heat and/or lot number
 3. Quantity, size
 4. Date and time filler metal is issued
 5. Joint number (serial number of item number)
 6. Welder's name
 7. Signature of welder's immediate supervisor
- d) Only one type of filler metal shall be issued to a welder at any one time and any previously issued but not used, shall be returned for bake-out or disposal.

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- e) During periods of inclement weather, electrodes shall be protected from moisture all times between issuance and use.
- f) All unused electrodes shall be returned to the issuing storeroom for reconditioning or disposal.

3.5

WELDING REQUIREMENTS

3.5.1

Cutting

- (a) Edge preparation of the base metals shall be accomplished by machining, chipping, and grinding or thermal cutting. Treatment after thermal cutting is described below.
- (b) Preheating before thermal cutting shall comply with NE-4211 and NE-4612.
- (c) Stainless steel and non-ferrous material may be flame-cut by the flux injection process (not iron powder), or by inert-gas-shielded tungsten-arc cutting and carbon air arc gouging, provided the cutting operation is followed directly with the removal of approximately 1/8" depth from the flame-cut surface. The finished edge shall be free of irregularities and shall be blended into the adjacent surface by grinding.
- (d) Carbon and low alloy steel materials may be cut to size and shaped by flame-cutting provided all accumulation of slag and oxide are removed from the cut surface.

3.5.2

Cleaning

- (a) Grinding shall be limited to resin of rubber bonded aluminum oxide or silicon carbide wheels or carbide burrs. The weld preparation and adjacent base metal surfaces for a minimum of one(1) inch on each side of the weld preparation shall be smooth, clean and free of any foreign matter. Clean stainless and non-ferrous parts with acetone, re-distilled isopropyl or ethyl alcohol. Cleaning shall be in compliance with UE&C Document MPS-100, and NE-4412.
- (b) For carbon and low alloy steels, contractor may apply a coating of Special Chemicals Corporation "Deoxaluminate," or purchaser approved equal, rust preventative coating after cleaning and inspection. Coating shall be applied by brush or spray to produce a dry film thickness of 1.0 mils min. (4.0 mils min. wet film). If any evidence of rusting appears prior to welding, the surface area shall be recleaned. Deoxaluminate may be welded over directly provided it is sound and rust free.

- (c) Each pass of an austenitic stainless steel weld shall be cleaned of slag and flux with austenitic stainless steel brushes only. Stainless steel brushes not contaminated by use on any other material shall be used on stainless steel.
- (d) For other materials, each pass of deposited weld material shall be cleaned using slagging picks, aluminum oxide or silicon carbide grinding wheels bonded with either resin or rubber, or carbon steel wire brushes.

3.5.3 Joint Design

Joint design for components shall be defined in applicable UE&C equipment specification, drawing, or ASME Boiler & Pressure Vessel Code, Section III (Div. 1), Subsection NE.

3.5.4 Tack Welds

All tack welds shall be made in accordance with NE-4231.1.

3.5.5 Double Welded Joints

Double welded joints shall be prepared by suitable methods, and welded in accordance with NE-4423.

3.5.6 Fillet Welds

Fillet welds shall be deposited to meet the requirements of NE-4427 and NE-4429.4. The size of the weld shall be determined in accordance with Fig. NE-4427-1.

3.5.7 Temporary Attachments

3.5.7.1 Welding of temporary or minor permanent attachments shall be in accordance with the requirements of NE-4435.

3.5.7.2 All welds shall be examined in accordance with the requirements of NE-5000.

3.5.8 Permanent Attachments

3.5.8.1 Welding of permanent attachments which are welded to pressure retaining components shall be in accordance with the requirements of NE-4320 and NE-4430.

3.5.8.2 All welds shall be examined in accordance with the requirements of NE-5000.

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Weld Appearance(a) Peening

Peening shall be performed only with specific approval of the purchaser, and if approved, peening shall meet the requirements of NE-4422.

(b) Surface Finish of Welds

Surface finish of welds shall meet the requirements of NE-4424 except welds subjected to ultrasonic examination where required by the applicable specification shall be 250 RMS (RHR) minimum.

(c) Manual Welds

Stringer beading is preferred. Weave beading with covered electrodes shall not result in a weld bead with a width greater than 3 times the electrode core diameter for stainless steel and 5 times the electrode core diameter for carbon or low alloy steels.

(d) Reinforcement of Welds

Weld reinforcement shall be in accordance with NE-4426.

(e) Arc Strikes

Arc strikes shall be removed by grinding. Arc strikes produced by welding electrodes or magnetic particle inspection shall not be purposely made on base metal surfaces outside of the weld groove area or other areas not to be covered by weld metal. Where inadvertent arc strikes which penetrate the base metal surface occur outside the weld area or on the final weld the surface shall be ground to the bottom of the depression and liquid penetrant or magnetic particle inspected. If the design material thickness has been violated, repair welding shall be in accordance with Section 3.8 of this document.

(f) Uniformity of Welds

Each weld shall be uniform in width and size throughout its full length.

(g) Defects

Any cracks, blowholes or other defects that appear on the surface of the weld beads shall be removed by chipping or grinding before the next covering weld bead is deposited. Stagger all stops and starts. Stops and starts shall be inspected and all defects removed.

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(h) Suckback

Weld rounded depressions are permitted up to a 1/16" deep, provided the width is at least 3 times the depth and the thickness thru the weld is not reduced below the adjacent base metal thickness.

3.5.10 Weld Metal Overlay Cladding

3.5.10.1 The thickness of cladding shall be at least 3/16" in the final surface condition unless otherwise specified in the applicable equipment specification.

3.5.10.2 Visual examination of the base material shall be performed prior to cladding. Acceptance criteria shall be in accordance with Section 5 of this document.

3.5.10.3 Liquid penetrant inspection shall be performed on the final clad surfaced area. Acceptance criteria shall be in accordance with Section 4.1 (e) of this document, and Article 6 of Section V and the acceptance standards of NE-5350.

3.5.11 Welding of Clad Plate

3.5.11.1 Welding procedure qualifications shall be in accordance with Para. 3.14 and NE-4429.

3.5.11.2 Welding performance qualifications shall be in accordance with NE-4340.

3.6 Dissimilar Metal Welds

Wherever possible dissimilar metal welds shall be made in the shop. For welded connections between austenitic stainless steel, Ni-Cr-Fe, nonferrous and others, and carbon/low alloy steel piping and components, welding shall be in accordance with Paragraph 3.3, except as specified herein.

3.6.1 Butt Weld Joints

Dissimilar carbon and low alloy steels that require postweld heat treatment (NB-4600) shall be buttered with type Ni-Cr-Fe F No. 43 filler metal and postweld heat treated after buttering. The minimum thickness of the "buttered" area after end preparation shall be 3/8". The joint shall then be welded with Ni-Cr-Fe (F No. 43). The completed joint shall not be postweld heat treated.

3.6.2 Dissimilar butt joints made of carbon/low alloy steels that do not require postweld heat treatment may be welded, without buttering, using type 309 (F-6) (F-5) or Ni-Cr-Fe (F-43) filler metal for the entire joint. The carbon or low alloy steel parts shall be preheated in accordance with ASME Section III, (Div. 1) Subsection NA Appendix D. The completed joint shall not be postweld heat treated.

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3.7

Postweld Heat Treatment & Control of Preheat and Interpass Temperatures

3.7.1

Preheating techniques and preheat and interpass temperature measurement procedures shall be such as to ensure that the full thickness of the weld joint preparation and adjacent base material is at the specified temperatures as shown in ASME Section III (Div. 1), Subsection NA, Appendix D. When flame heating is used only a neutral flame shall be employed. The heating shall be applied in such a manner as to disperse the heat evenly over an area approximately 6 times the width of the base material thickness. Temperature shall be determined by either surface contact pyrometers, or thermocouples, but not by low melting metallic alloys. Temperature indicating crayons are permitted if they are free from sulfur and halogens.

3.7.2

Welds requiring postweld heat treatment, shall have preheat maintained until postweld heat treatment is performed. Postweld heat treatment shall be performed in accordance with ASME Section III (Div. 1), Subsection NA, NE and UE&C Document MPS-1.

3.7.3

Time-temperature recording equipment shall be utilized for all postweld heat treatments. Charts and data sheets shall be identified as to component(s) processed, dated and signed by Contractor and become part of documentation record provided to the purchaser.

3.7.4

All marking fluid and tapes used for temporary marking shall be removed with purchaser approved solvents prior to thermal treatments.

3.7.5

The welding procedure shall specify any preheating requirements and interpass temperature requirements.

3.7.6

The contractor shall submit procedures for monitoring preheat on low alloy steels to verify that preheat is being maintained until postweld heat treatment has been performed. Preheat temperatures shall be shown on the weld history records, failure to comply with Para. 3.1, 3.7.3 and 3.7.6 as referenced in this specification shall be cause for rejection. However, the rejection may be resolved by verifying soundness of the weld using an acceptable examination method approved by the Construction Manager.

3.8

Repair Welding

3.8.1

Repair of Base Metal Defects

Repair of base metal defects including arc strikes, do not require approval unless the repair exceeds 1/3 of the nominal thickness, or the repairs are made subsequent to any of the conditions noted in the subparagraphs below. Listed below are the types of repairs requiring purchaser's approval, prior to performing repair welding:

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- (1) Repairs following final heat treatment
- (2) Repairs following final hydrostatic testing
- (3) Specific approval must be obtained for repairs of cracks or fissures which recur in welds or base material after the third cycle of repair.
- (4) Repairs of weld end preparations which exceed 1/3 the nominal thickness.

In addition to the above, all defect repairs shall meet the requirements of NE-2500 of the ASME Code.

3.8.2

Repair of Weld Metal Defects

Unacceptable weld defects detected by the methods required by NE-5000, and/or NE-6000 shall be eliminated and repaired in accordance with the following, except specific approval must be obtained for repair welds after the third cycle of repair. If after the third repair attempt, the joint has not received final acceptance, the weld will be cut out 100%, including the heat affected zone and prepared in accordance with Section 3.5 of this document. The joint will then be rewelded in accordance with the requirements of the original welding procedure.

In addition to the above requirements, all repair(s) of weld metal defects shall be performed in accordance with NE-4450.

The contractor who makes a repair weld shall prepare a report which shall include a chart which shows the location and size of the prepared cavity, the welding material identification, the welding procedure, the heat treatment and the examination results of repair welds exceeding in depth the lesser of 3/8" or 10% of the section thickness.

3.8.3

Repaired components, piping or portions of components or piping that have been postweld heat treated within the requirements of NE-4620 shall again be postweld heat treated when required by NE-4640.

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4.0

NONDESTRUCTIVE EXAMINATION AND TEST METHODS

4.1

GENERAL

- a) If required, weld end preparations shall be examined by liquid penetrant or magnetic particle examination prior to welding, in accordance with ASME Section III, Subsection NE. Method requirements are contained within paragraph 4.4 below.
- b) The final examination of all welds shall be performed on the final weld surface. Welds not accessible for examination after final assembly shall be examined and accepted prior to final assembly.
- c) Written procedures are required for all examination and test methods and shall detail the specific requirements of NE-5112. All written procedures shall be submitted to the Purchaser for review and comment by the NDE group prior to use.
- d) Discontinuities in the weld zone shall be evaluated in accordance with the "Weld Acceptance Standards" of NE-5300. Discontinuities detected in the adjacent base material, during the performance of weld examination, shall be evaluated in accordance with Material Specifications or Subsection NE requirements, as applicable.

4.2

PERSONNEL QUALIFICATION

- a) Personnel performing nondestructive examination under this specification shall be qualified in accordance with the recommended guidelines of SNT-TC-1A supplements and appendices as applicable for the techniques and methods used. Nondestructive examination shall be the responsibility of personnel certified to Level II or Level III.
- b) For nondestructive examination methods not covered by SNT-TC-1A documents, personnel shall be qualified by the Manufacturer to satisfactory levels of competency by subjection to similar examinations on the particular method involved.
- c) The Manufacturer shall develop his own training program which shall be submitted to the Purchaser for review and comment by the NDE group.
- d) The Manufacturer shall submit the qualification and background records of his designated Level III individual.

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4.3

VISUAL EXAMINATION

- a) Visual examination shall be performed in accordance with Article 9 of ASME Section V. All weld characteristics and surface conditions shall be in accordance with the requirements of NE-4400.
- b) The acceptability of fillet welds shall be established by suitable gages or templates. The minimum required size of each fillet weld shall be in accordance with paragraph a) and as specified on applicable drawings and welding procedures.

4.4

LIQUID PENETRANT/MAGNETIC PARTICLE EXAMINATION

4.4.1

Weld surfaces and adjacent base material shall be cleaned and prepared for examination, in accordance with the requirements of Article 6 or Article 7 of ASME Section V, as applicable.

4.4.2

Liquid penetrant examination shall be conducted on non-magnetic material. Magnetic particle examination shall be performed on material that can be magnetized. For material that can be magnetized, liquid penetrant examination may be used only when part geometry or space restriction prevents magnetic particle examination.

4.4.3

Liquid penetrant examination shall be performed on non-magnetic material. The method shall be in accordance with the requirements of Section V, Article 6.

- a) The penetrant materials intended for use shall be of one complete family produced by a single manufacturer and shall be clearly defined by product type and designation within the written procedure as required in paragraph 4.1 c). Intermixing or substitution of materials is prohibited. Materials employed shall be certified by the manufacturer to contain less than one percent total, by weight, of either sulfur or halogens.
- b) Abrasive blasting prior to liquid penetrant examination is prohibited.
- c) Evaluation of indications and acceptance standards shall be in accordance with NE-5351 and NE-5352.

4.4.4

Magnetic particle examination shall be performed on material that can be magnetized. The method shall be in accordance with the requirements of Section V, Article 7.

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- a) For magnetic particle examination, regardless of the magnetizing technique, the continuous method of examination shall be employed.
- b) Evaluation of indications and acceptance standards shall be in accordance with NE-5341 and NE-5342.

4.5

RADIOGRAPHIC EXAMINATION

- a) Radiographic examination shall be in accordance with the requirements of ASME Section III, Subsection NA, Appendix X. Acceptance standards shall be in accordance with ASME Section III, paragraph NE-5320.
- b) Examination of welds, shall be performed so as to include coverage of adjacent base material within the density range specified by Appendix X, Subsection NA.
- c) When 100% radiographic coverage is required and is not possible, a detailed explanation and the proposed alternate NDE examination shall be submitted to the Purchaser for review and comment.
- d) For other than multi-speed film techniques, a double film technique shall be utilized. The second film shall serve as a comparison radiograph for evaluation of artifacts or relevant indications.
- e) The type of radiographic film employed shall be in accordance with ASTM E94-68, Type 1 or 2. The radiographic density shall be in accordance with the requirements of Appendix X, Subsection NA.
- f) Radiographic examination shall be carried out utilizing a marking system which provides evidence of continuous and complete coverage. Welds shall be radiographed with two(2) or more markers for each film area, except one(1) marker may be used for pipe 3-1/2" O.D. and smaller.
- g) Films shall be identified in a manner which provides positive and permanent traceability. Identification shall include date, manufacturer's name or symbol, item number, joint number, area and other related items. It is desirable that the repair cycle, i.e., R-1, R-2, etc. be part of the identification.
- h) Radiographs submitted for review shall be accompanied by a review form and radiographic technique sheet which identify the approved written procedure. The manufacturer shall certify in writing compliance to the referencing code and shall provide any additional data required for interpretation of the subject radiographs.

- i) Radiographic review forms shall identify and disposition, acceptable or rejectable, noted discontinuities, weld and adjacent base metal surface conditions, artifacts and other conditions related to the proper evaluation of radiographs.
- j) Final and required in-process radiographs shall accompany shipment of the component where practicable, but in any case, the radiographs shall be on site prior to installation. For field applications, radiographs shall be submitted to the Owner upon completion of fabrication.

4.6

ULTRASONIC EXAMINATION

- a) Ultrasonic examination shall be in accordance with ASME Section V, Article 5.
- b) Acceptance criteria shall be in accordance with ASME Section III, Subsection NE, paragraph NE-5330.

4.7

OTHER TEST METHODS

- a) Any additional test methods shall be performed in accordance with the requirements of paragraphs 4.1 c) and 4.2.

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5.0 INFORMATION TO BE SUBMITTED

5.1 AFTER AWARD

5.1.1 Weld Identification

Contractor shall provide for identification of all welds. The weld identification method employed shall be the basis for reporting all quality aspects.

Weld identification shall be referenced on all weld documentation including nondestructive test records.

5.1.2 Weld Documentation

- a) Contractor shall furnish a weld record similar to Fig. No. 1 (attached) covering each shop and field piping weld. Applicable data shall be recorded on the form and signed off by Contractor's Quality Control Engineer. Contractor may use alternate weld document record subject to approval of Purchaser.
- b) When penetrant or magnetic particle inspection, radiography, and postweld heat treatment is a requirement of the specification or code, the supplier shall attach to the form a certified copy of the laboratory examination report and signed heat treatment chart record.

5.1.3 Records

Contractor shall maintain records of all information pertinent and traceable to the fabrication and testing of detail material and fabrications. Records shall include the applicable ASME Code Data Report, Weld Documentation, weld procedure and welder performance qualifications, welder identification, current welder qualification status, postweld heat treatment procedures and charts, welding filler material certifications, material certifications, welding repair records, inspectors' qualifications, nondestructive test procedures and qualifications, inspection and test records, radiographs and weld maps.

Submittal of records shall be in accordance with the referencing specification section or other applicable Quality Assurance document.

INFORMATION ONLY

FABRICATION TRAVELER AND PROCESS CHECK LIST
N-STAMP APPLICATIONS

FIGURE 1

SECTION - A
CLASS I, II, III

JOINT TYPE:

BUTT INSERT _____
BUTT BR _____
OPEN BUTT _____
SOCKETS FILLETS _____
HEAT TREAT REQUIREMENTS _____
PREHEAT _____ °F MIN.
INTERPASS _____ °F MAX.
STRESS RELV. _____ °F TEMP. _____ TIME

BASE METAL _____ TYPE IDENT _____
TO _____
BASE METAL _____ TYPE IDENT _____
WELDING PROC. _____
WELD MAP NO. _____
JOINT NO. _____

SYSTEM _____
SPOOL SHEET OR _____
DRAWING NUMBER _____ REV. _____
SPECIFICATION _____
PREPARED BY _____
DATE _____

SECTION - B

FABRICATION REQUIREMENTS ITEM NOS		ACCEPT	REJECT	N/A	CONST	QC REP	DATE	CODE HOLD	CODE CHECK PTS	CODE INSP.
1. MATERIAL IDENTIFICATION TYPE HT. NO.										
a) INSERT OR SACKING RING _____										
b) BASE MATERIAL _____										
c) GASE MATERIAL _____										
2. FIT UP										
a) FITTER IDENT _____										
b) WELD PREPARATION _____										
c) PRE WELD CLEANLINESS _____										
d) ALIGNMENT _____										
e) 1/16" RETRACTION FOR SOCKETS _____										
f) PRE WELD PURGE _____ CFH										
3. ROOT WELD										
a) WELDER IDENT _____										
b) POSITION F V O H _____										
c) FILLER MATERIAL TYPE-SIZE-HT. NO. _____										
d) SHIELD GAS FLOW _____ CFH										
e) PREHEAT TEMP. _____ °F INTERPASS _____ °F										
f) METHOD OF MEASUREMENT										
CRAYON <input type="checkbox"/> CRAYON <input type="checkbox"/>										
PYROMETER <input type="checkbox"/> PYROMETER <input type="checkbox"/>										
RECORDER <input type="checkbox"/> RECORDER <input type="checkbox"/>										
g) INSPECTION VT _____										
MT _____ PT _____										
RT _____										
h) DEFECTS OR DEFICIENCIES _____										
i) RESOLUTION _____										
4. REMAINDER OF JOINT										
a) PURGE _____ CFH										
b) SHIELD GAS FLOW _____ CFH										
c) POSITION F V O H _____										
d) WELDER IDENT _____										
e) FILLER MATERIAL TYPE-SIZE-HT. NO. _____										
f) PREHEAT TEMP. _____ °F INTERPASS _____ °F										
g) METHOD OF MEASUREMENT										
CRAYON <input type="checkbox"/> CRAYON <input type="checkbox"/>										
PYROMETER <input type="checkbox"/> PYROMETER <input type="checkbox"/>										
RECORDER <input type="checkbox"/> RECORDER <input type="checkbox"/>										
h) INSPECTION VT _____										
MT _____ PT _____										
RT _____										
UT _____										
i) DEFECTS OR DEFICIENCIES _____										
j) RESOLUTION _____										
5. POST WELD HEAT TREATMENT										
a) PROCEDURE NO. _____										
b) METHOD										
INDUCTANCE <input type="checkbox"/> TEMP. _____ °F										
RESISTANCE <input type="checkbox"/> TEMP. _____ °F										
OTHER <input type="checkbox"/> TEMP. _____ °F										
c) METHOD OF MEASUREMENT										
RECORDER <input type="checkbox"/> CHART NO. _____										
PYROMETER <input type="checkbox"/>										

SECTION - C - DESCRIPTION OF DEFECTS OR DEFICIENCIES Rework
LIST BY ITEM NO.

DEFICIENCY REPORT NO. _____

Q.C. ENGR. _____ DATE _____ AUTHORIZED CODE INSP. _____ DATE _____

SECTION - D DISPOSITION ACTION ON DEFICIENCY REPORT NO. _____

VERIFIED AND ITEM REINSPECTED

WELDING SUPERVISOR _____ DATE _____

QUALITY CONTROL ENGR. _____ DATE _____

SECTION - E - FINAL SIGN OFF

WELD SUPV. _____ DATE _____

Q.C. ENGR. _____ DATE _____

AUTHORIZED CODE INSP. _____ DATE _____

NO INFORMATION